

# EXPLOSIVES SAFETY

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## DEFENSE AMMUNITION CENTER (DAC) COMPLETES BASE REALIGNMENT AND CLOSURE (BRAC) MOVE

As of 30 September 1999, DAC's move to McAlester is complete and the Savanna Army Depot Activity at Savanna, IL, is to be closed in Mar 00. A total of 227 spaces transferred with DAC to McAlester. Approximately 70 percent of personnel transferred. "We had hoped that a large number of our experience and talented personnel would make the exodus and they did not let the Army down. The remodeling and the construction of our new buildings and the training range are all completed and we are nearly at full strength," said James Q. Wheeler, DAC Director. The buildings housing DAC employees include the main building, the instruction complex, and the ammunition maintenance and transportability complex. Also completed in April was the training and test range. The DAC missions include logistics engineering, demil technology, training, ammunition career program management, review and technical assistance, as well as explosives safety. A major benefit to the United States Army Technical Center for Explosives Safety (USATCES) has been the consolidation of our workforce into one building versus five.

In conjunction with the BRAC realignment, we reorganized to better support our explosives safety missions. USATCES is comprised of three divisions with the following missions.

1. Ordnance Explosives and Environmental Division, Chief, Mr. Mel Colberg, SIOAC-ESL, DSN 956-8742/comm (918) 420-8742. Missions include development of HQDA policies, procedures, and regulations addressing explosives/chemical agent safety aspects of ordnance and explosives (OE) cleanup operations; review and approval of safety submissions for the cleanup of real property containing unexploded ordnance (UXO); technical assistance for OE removals and land disposals; and assisting the Corps of Engineers in the conduct of the Formerly Used Defense Sites Program.

2. Chemical Safety and Data Division, Chief, Mr. Barry Willmington, SIOAC-ESM, DSN 956-8007/comm (918) 420-8007. Missions include chemical site safety submissions, chemical operation and equipment pre-operational surveys, augmentee support to DAIG chemical surety inspections, support of the DA Chemical Agent Safety Council (DACASC), chemical waivers and exemptions, operation of the Joint Hazard Classification System and Explosives Safety Information Data Bases, and operation of the John L. Byrd Jr. Technical Library for Explosives Safety.

3. Risk Management Division, Chief, Mr. Kenyon Williams, SIOAC-EST, DSN 956-8756/comm (918) 420-8756. Missions include explosives site safety submissions, hazard classification, developing and maintaining the Army explosives safety standards, explosives accident investigation support, tracking DDESB findings at Army installations, providing technical assistance on explosives safety, managing Army explosives safety testing, SOP reviews, and approving and tracking Army waivers and exemptions.

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## HAZMAT TRANSPORTATION/ HAZMAT TRAINING

Safe and effective transportation and movement of our military members is an important issue in the Department of Defense (DOD). There is an important factor in these movements which requires additional consideration. That factor is hazardous material or HAZMAT as it is commonly called.

Ask a military member if there is HAZMAT in a vehicle being loaded, and unless he has been properly trained, the answer is very likely to be "No, sir." Most military members feel that everything they ship is a part of their unit material/equipment and without proper training, they actually have no way of knowing whether what they load is HAZMAT or not.

Training is the operative word here – and Fort Hood has the distinction of being the first military installation to have a campus from the Defense Ammunition Center (DAC). DAC is one of four service schools authorized to train DOD personnel to certify hazardous materials for transportation.

Because proper training is a critical part of HAZMAT transportation, it is important to know the types of training available in the HAZMAT classrooms. The first thing to know is that any person who affects the transportation of HAZMAT on public highways in any way needs some training. These people range from the commander who directs personnel to prepare for a movement down to the handler who is packing and loading the material on the vehicle. However, different personnel need different types of training.

The most intense training is for a certifier – that person who signs the HAZMAT documentation, certifying that the HAZMAT is packaged, marked, labeled, and totally compliant with local, federal, DOD, and international laws and regulations governing transportation of HAZMAT. Certifiers are required by DOD regulations to be school trained by one of the four authorized service schools. The campus at Ft. Hood is a part of one of those schools and considered an authorized certification school. The two-week course covers all laws and regulations in depth, but two weeks training is not enough to make one an expert. Expertise comes with practice and use of the skills. Expertise also means that the certifier not only must be trained, but must be provided with the correct publications and supplies (i.e., packages, labels, placards, and packing materials) to do the job correctly.

Others who do not certify hazardous cargo need training based on their particular job function. Personnel who are directing HAZMAT transportation need, at a minimum, safety and awareness training. This training is

not only a DOD requirement, but required by law as it is a part of the 49 Code of Federal regulation – the U.S. transportation law book.

Military members who drive trucks, put packages of HAZMAT together, and do all the other "nitty gritty" work that is involved in the transportation cycle also need the safety and awareness training. In addition, these personnel need function specific training – that is training on how to do the specific job.

Safety and awareness training is available at Ft. Hood in a couple of formats. First, the HAZMAT library has a computer lab set up with the computer based HAZMAT Familiarization and Safety Course designed by DAC. This is a self-paced study class which may be taken by one student at a time. Testing is completed after students complete the course and records are maintained in the HAZMAT library.

In addition to the one person training available, the HAZMAT library has a classroom which can be reserved by a unit certifier for training up to 20 students. The unit certifier is the instructor and uses materials provided by the HAZMAT library. An exam is given and training records are maintained.

All personnel require retraining within 24 months. Retraining for non-certifiers can be local training available through the HAZMAT library or unit training offices. Retraining for certifiers must be provided by one of the four service schools. The retraining requirement may be met by completing the two-week course again or by attending a one-week course which can be scheduled if enough personnel request it.

HAZMAT training is important and available at Ft. Hood. The personnel at the HAZMAT classroom are flexible and will work with units to provide short briefings on HAZMAT when they are not involved in presenting scheduled classes. For more information, contact Robin Christian, Jim Wagner, Rod Conrad, Al Benavides, or Cliff Moore at the HAZMAT school and library at DSN 287-7607/6835/6007/9537.

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## DEMILITARIZED SCRAP CERTIFICATION PROJECT

The U.S. Army Defense Ammunition Center (USADAC) and the Tennessee Valley Authority (TVA) are cooperatively working on a project to quantitatively identify the amount of energetic residue that remains on scrap metal and other materials that have been classified as 3X or 5X in accordance with TB 700-4. The potential for serious accidents occurs when unexploded items are accidentally cleared as scrap or when too much energetic material remains on materials cleared for sale. This project is aimed at standardizing and improving the clearance of processed scrap material to avoid the latter problem.

Data collected from this project will be used in conjunction with the Munitions Items Disposition Action System (MIDAS) database to help determine how items can be safely demilitarized and what level of contamination remains given a particular item, energetic material, and demilitarization process. The data can also be used by Army environmental officials to determine the impact of a particular item on the environment, depending on the demilitarization method employed. The data will provide a baseline for demilitarization efficiency for existing processes, can be used to evaluate the potential of new technologies, and will provide opportunities for cost effectively optimizing current technologies. Currently, residues found on scrap from demilitarization processes at IOC installations are subject to interpretation by the installations regarding safety and environmental concerns as established in IOC Pamphlet (IOCP) 185-1, 10 Jul 97, Classification and Remediation of Explosive Contamination. According to the regulations, the clean up standard of 5X and 3X are open to interpretation since they are based solely on a visual inspection.

The scrap certification project analyzes samples of scrap generated from deactivation furnaces, flashing furnaces, hot-gas decontamination, breakdown, melt out, wash out and open burn/open detonation (OB/OD) systems. Materials analyzed include projectiles ranging from 105mm to 8-inches, 750-pound bombs, booster cups, rocket motors and tubes, cartridge casings, powder cans, and general scrap from OB/OD operations. The focus has been on secondary explosives and propellants. Sample analyses have shown that some wash out processes (normally considered 3X) are as efficient as the standard 5X processes. By developing a quantitative

standard based on the amount of residue remaining in an item, there may be opportunities to reclassify some 3X processes as 5X processes, thereby eliminating a potential step that is now required.

OB/OD processes are the most difficult to characterize because of the age and uncertainty of the material being analyzed from any particular OB/OD grounds. Newly opened OB/OD grounds are being examined to better identify the amount of residue remaining after a particular detonation. This data will then allow OB/OD to be compared with the newer technology driven methods of demil.

USADAC will share information learned from this project with demilitarization facilities to optimize the processes that are currently being used. By identifying the amount of explosive residue in scrap, installations also can determine the best resource, recovery, and re-use (R<sup>3</sup>) options that should be applied to the materials including scrap metal or reclaimed energetics.

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## WHOSE FAULT IS IT?

In the Jun 99 Explosives Safety Bulletin, we requested articles sharing initiatives. Mr. Dan Serrano, U.S. Army Research Laboratory (ARL) Safety Office, has submitted this article on an initiative that has worked well at ARL.

As an example, the test director energized the firing unit to arm a TOW warhead for the test. The unit pre-triggered, detonating the warhead. Everyone was in a protected location when the firing unit was turned on, as required by the SOP, and thankfully no one was injured. Investigation revealed that the constant connecting and disconnecting procedures for the electrical harness had caused the ground wire to come loose from the plug and ground itself. When the unit charged, the capacitor dumped, firing the warhead.

## THE ADVANCED FIRE PROTECTION DELUGE SYSTEM (AFPDS)

Normally, this would probably not have been reported since there were no injuries. That's the way things are in the real world. No one wants to be blamed for a failure. With accidents or near misses, usually knowing who did it isn't as important as knowing what happened.

This concept came to Mr. Serrano from an article in the magazine "Professional Safety", which recommended a reporting system that gave precedence to safety information over the desire to know who did what. The worker can usually provide the best information on how things are really working. The trick is getting them to provide it so that we can all learn from it.

Based on this concept, ARL decided to implement an addition to their explosives safety program and call it the No-Fault Reporting System. It began with an organizational meeting of experimental facility personnel, telling them about the new system, its intent, and how it was going to work.

The system basically operates on anonymity. Any person having a "near miss" incident is encouraged to report it to the safety office and is assured anonymity will be maintained. After an investigation into the incident to determine its' cause(s), it is reported in detail to the workforce with names, locations, etc., remaining anonymous. The intention is to let everyone know what happened, the consequences if things had turned for the worse, and how the incident can be prevented from happening again. Naturally, it takes some time for the program to be accepted.

The goal of the program is education and accident prevention. Any information that can be obtained is welcomed so that we can learn from it. There is no way of knowing if all "near misses" are being reported, but we are certain many have been reported that previously would have been ignored. The program has been in place for almost two years now and is alive and well.

If you would like more details on the "No-Fault" Program, contact Mr. Dan Serrano, ARL. We appreciate ARL sharing this initiative and if you have explosives safety initiatives or articles to share, contact USATCES.

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Those of you who manage, maintain, and operate ultra high-speed deluge systems are all too familiar with the problems and limitations of currently installed systems. You've received the late night calls informing you of a false dump that has spilled thousands of gallons of water on your bay floors creating an environmental nightmare, unscheduled clean-up operations, and production shut downs. Even worse, you may have experienced an incident or major accident where your installed system functioned properly but was too slow to stop a deflagration, leading to an incident killing or injuring workers, and producing thousands of dollars of property damage to facilities and equipment. There is a system under development by the Army Ammunition Logistics Activity (AMMOLOG) and the Industrial Operations Command (IOC) that will improve significantly on current systems.

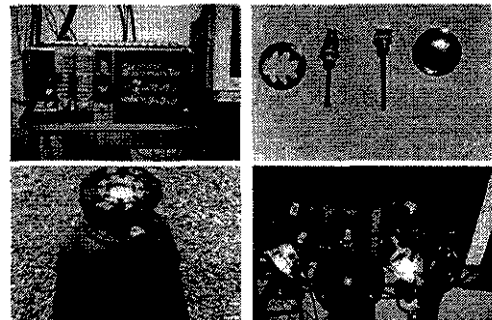
The system is called the Advanced Fire Protection Deluge System (AFPDS). The U.S. Air Force Defense Fire Research Laboratory at Tyndall Air Force Base in Florida is developing the AFPDS for the Army with funds provided by AMMOLOG and others. The system uses high-speed (3-5 millisecond) false alarm immune detectors similar to units currently installed in tanks and armored vehicles. These detectors quickly "see" the burning munitions and process an electronic signal through a controller that activates a nitrogen pressurized water sphere. This water sphere is specially designed to expel a cone shaped mist of high pressure water that quickly cools and extinguishes burning propellant, pyrotechnic, or high explosives. Knowing where a munitions fire will most likely occur, the sphere can be positioned over this location to rapidly intercept and interrupt a deflagration.



ADVANCED FIRE PROTECTION  
DELUGE SYSTEM



### DELUGE SYSTEM COMPONENTS

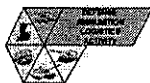


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In each of over 200 tests since Jan 96, the system has "seen" the burning material flame and extinguished the fire in its incipient stage. Tests thus far involved ¼ to 2 lbs. of pyrotechnics, propellants, and high explosives. Typically, the device is 10 times faster than the current DOD and NFPA standards. Recent propellant burn tests produced successful control and extinguishment of up to 25 lbs. of burning propellant. Heat flux equipment is used to measure the thermal effects on a human working nearby. The effects were minimal for the materials tested.

The spectral emissions of typical pyrotechnics and propellant materials were measured to determine the energy output in the infrared and ultraviolet regions. The emission data is used to optimize the detector parameters for each energetic material to reduce detection response time.

One of the most significant outcomes of the testing program has been the high degree of false alarm immunity possessed by the three new detectors used to operate the AFPDS. These detectors have proven immune to virtually every false alarm stimuli introduced. These included various lights, flash cameras, flashing light, drill motors, and MIG/stick welding. The detectors were exposed to the false alarm sources directly in front of the units for 30 seconds at various distances.



ADVANCED FIRE PROTECTION  
DELUGE SYSTEM



#### DELUGE TABLETOP SETUP



The AFPDS offers a significant improvement in speed, false alarm immunity, and reliability over currently installed systems. The system can be used in a stand-alone mode to supplement an existing deluge system and with the sphere or new detectors, to optimize an existing deluge system for optimization. It can also be used as a

self-contained portable unit. The AFPDS is being installed at four Army locations, which will allow further refinement. Work continues with evaluation of higher speed detectors that may cut the even improved response time in half. We are planning additional testing with larger quantities of pyrotechnics in a mixing configuration, if funding is available. We are also preparing an ultra high-speed deluge system handbook.

For additional information on this system, please contact Mr. Robert Loyd, IOC (Safety Team), DSN 793-2975, commercial (309) 782-2975, or Mr. Virgil Carr, Air Force Defense Fire Research Laboratory, DSN 523-3744, commercial (850) 283-3744.

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### RANGE TRAINING – SAFELY!

A review of the last three years (FY 96 – FY 98) of Army explosives accident data indicates training/range operations are currently the largest producer of Army explosives accidents. The Army has experienced 101 reportable explosives accidents on ranges over this 3-year period. During a recent Army explosives safety program evaluation at Ft. Knox, KY, we were pleasantly surprised to find that they have not had a reportable Army explosives accident in the last 5 years. Since Ft. Knox is very active in range operations and training, we recognized they had to be conducting range operations extremely well.

To find out how they accomplished this outstanding range safety record, we met with Mr. Andy Andrews, Range Control Manager, and Mr. Leonard Potter, Safety Specialist. According to Mr. Andrews, Ft. Knox understands the need for realistic training, but is seriously committed to conducting this safely. Most importantly, Range Control and Safety work closely together on range operations at Ft. Knox. He feels this is essential to ensure that safety is considered and built in to the range/training operations.

Mr. Andrews considers safety integration essential in three areas (planning, operations, and recovery) of every range operation. First, safety must be incorporated during the planning portion of a range operation. Second, safety

must be carried out through the conduct of the range operations, as they were planned. Third, safety must be carried out through the completion and recovery from the operation.

As one talks with Mr. Andrews and Mr. Potter, it is soon evident that Ft. Knox is serious about their explosives safety in range operations. They expect units using their ranges to know the Ft. Knox safety requirements through briefings and meetings conducted by them, and they expect and monitor the units for carrying out these safety requirements during range operations and recovery. It is evident Ft. Knox range operations expects full compliance. Units have been removed from Ft. Knox ranges for violations of safety regulations and when this word gets around, Mr. Andrews and Mr. Potter feel this insures units know and understand up front — professional and safe conduct of range operations is expected when they come to Ft. Knox.

Ft. Knox clearly conducts a professional range operation and their sharing of this information with the rest of the Army is greatly appreciated.

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## INERT/EMPTY CERTIFICATION

Due to recent incidents of arms, ammunition, and explosives (AA&E) being released to the public, an integrated process team (IPT) consisting of personnel from HQ Industrial Operations Command (IOC) and the Defense Ammunition Center (DAC) was formed to make recommended changes to AMC-R 755-8, 12 Apr 95, Authorizing, Accomplishing, and Reporting Demilitarization of Class V Materiel.

The changes recommended by the IPT were approved by the proponent and will be incorporated into the next revision of the regulation. The following changes, which were disseminated under ammunition information notice (AIN) 58-99, do not change the regulation, but have been approved by the proponent for immediate implementation:

a. Page 3-1, paragraph 3-2f will be "Two documents will be used to assure visibility and closed-loop accountability. The Ammunition Transfer Record (DA Form 4508) or equivalent document will be used to move ammunition from the storage location to the actual point of demilitarization. The quantity of items received at the demilitarization site will be verified with the quantity listed on the ATR. This form will perpetuate the document number used to adjust the accountable record and will contain the certificate of demilitarization which is to be maintained for a minimum of 3 years. Within 2 working days of demilitarization, the document number will be converted to a D9Z document with an M management code and processed to the accountable record. This will delete the item from the record. A locally devised document to record the quantity of items placed in each demolition pit or burn pan may also be used to perform a blind count of items destroyed."

b. Page 3-12, paragraph 3-11b(2) will be "Stamps which identify the inspecting operator will be signed for and used by the operator."

c. Page 3-12, paragraph 3-11b(3) will be "A means to prevent and identify tampering with units after inspection and prior to movement to DRMO. Examples of methods to prevent tampering include (but are not limited to) lead seals on large objects, the strapping of smaller containers to a pallet, or the use of plastic shrink wrap."

d. Page 3-12, paragraph 3-11b(4) will be "Maintain separate, well defined areas for material awaiting inspection/certification, and for materiel already certified as inert. This is to assure that no energetic material is mixed with material which has been inspected and certified as inert. The separation must be maintained for the storage of materiel awaiting transportation to DRMO or sale through a qualified recycling program. These areas can be separated by space or by physical barricades, but must be well defined or marked to assure stock is not mingled."

e. Page 3-13, paragraph 3-11b(6) will be "Establish audit procedures IAW chapter 4, SB 742-1, Ammunition Surveillance Procedures, for Quality Assurance personnel

to verify adequacy of the inspection process and to verify the validity or operational supervisor's inert certification."

f. Page 3-13, paragraph 3-11c(5) will be "Containers physically opened will be stamped (operator identified) on the interior and exterior to indicate they have been inspected."

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## RELEASE OF ENERGETIC MATERIEL

Just the thought of releasing explosive contaminated items to an unsuspecting public is scary. Unfortunately this nightmare came true for one U.S. Army installation recently. On 20 Jan 99, a scrap vendor found three 5" HE rocket warheads in containers that had been purchased from this Army installation in a 5X condition. These warheads were originally packed with the rocket motor as unassembled 5" HE rocket, NSN 1340-00-038-8398, DODIC H655. The complete NSN was documented at this installation as being completely destroyed in Mar 97.

Upon notification from the vendor, PDO sales were immediately suspended until further notice. Reporting the incident to headquarters soon followed. The installation began screening material in the yard 100% for energetics and found an additional 14 rounds of 5"/38 caliber propelling charges in the PDO yard. Scrap in that pile had also been declared 5X by the same crew that generated the rocket warheads.

An AR 15-6 investigation team was formed and directed to look into the matter. All prior sales from the PDO yard since 1995 were reviewed to determine if material sold could contain energetics. All ammunition containers were now considered suspect. Inspection survey teams were formed to screen containers 100% at the vendors that purchased those items. Fourteen sites were visited and all but one was "clean". An additional 5"/38 caliber propelling charge and one rocket were found. All items found at the vendor's yard were destroyed by Army EOD technicians.

Procedures at this installation were tightened, re-training began, and responsible personnel were held accountable. Every container is now individually handled to prevent a possible oversight that could occur when downloading from a palletized configuration. All personnel detailed to inspect/certify containers or verify the process have received additional training in the application and placement of stamps, thereby assuring all containers are inert. The operator and quality control person now perform a 100% inspection; both certify the container by stamping the inside and outside. Model descriptions and nomenclatures of generated containers are amplified on the shipping documents to assist accountability and tracking.

We are confident that our corrective actions will keep this from recurring, but urge you to learn from this mistake. Take the necessary actions to prevent this nightmare from happening to you. Point of contact is Ms. Rosalene E. Graham, CSP, Chief, Safety/RAD Waste Team, IOC, DSN 793-2989, comm (309) 782-2989, e-mail: [grahamr@IOC.army.mil](mailto:grahamr@IOC.army.mil).

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## TAGGANTS IN PLASTIC EXPLOSIVES

For the past several years, the chemical 2,3-dimethyl, 2,3-dinitrobutane (DMDNB) has been blended into U.S. manufactured plastic explosives to insure that they are easily detectable by electronic sensors. Recently, production requirements were changed to increase the required concentration of DMDNB in the explosives, causing some concern over possible health effects to workers who breathe these vapors.

There is no OSHA established permissible exposure limit (PEL) for DMDNB. Because of this, the Army Center for Health Promotion and Preventive Medicine (USACHPPM) undertook to research the health effects of the chemical. Their research led them to establish a PEL of 0.15 mg/m<sup>3</sup> for an 8-hour daily exposure.

Six air sampling studies were conducted by USACHPPM to determine the scope of the perceived problem. These studies looked at DMDNB levels on composition C-4 production lines, on M112 demolition block manufacturing lines, in bulk magazine storage, and in magazine storage of finished M112 blocks. The

studies indicated that there were some personnel exposure problems in production and manufacturing areas; in the magazines storing newly manufactured, bulk packed C-4 explosive, the exposure level was approximately at the PEL; but in magazines storing finished M112 blocks, the level was two to three orders of magnitude below (less than 1 percent of) the PEL.

Actions to control personnel exposure are already in place within the manufacturing and production facilities. An 8-hour per day time limit for operators in bulk storage magazines has been recommended. Based on currently available toxicity data, no DMDNB toxicity hazard exists in magazines storing finished end items containing tagged explosives, and no particular precautions are required.

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## **AVIATION AND MISSILE COMMAND (AMCOM) MUNITIONS TEAM WEBSITE**

Guided missile large rocket malfunction reports and ammunition condition reports (ACRs) can and should be submitted using the following AMCOM Munitions Team website: <http://ammo.redstone.army.mil>.

Missile information notices (MIN), missile supplemental notices (MSN) and TB 9-1300-385 data can be reviewed on this same website. Ammunition data cards and the Ammunition Book Complete, which is under construction, will be released to all users as soon as the application is operational and data loaded.

Just log onto the website and look down the page and click on "Request an Account Here". Fill out the blocks that apply being sure to use your official mailing address, provide your security officer information, and check the applications you want access to.

If additional assistance is needed, contact: Mr. Jessie Wright, DSN 746-1236, e-mail: [wright-ji@redstone.army.mil](mailto:wright-ji@redstone.army.mil) or Mr. Randy Davis, DSN 746-5829, e-mail: [davis-rn@redstone.army.mil](mailto:davis-rn@redstone.army.mil).



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